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AUTHOR	Hall, Michael E.; Fanning, Ronald H.
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ABSTRACT

This paper provides architects and educational planners with data on the necessary space requirements for restrooms, mechanical rooms, custodial spaces, food service, construction enclosure space, and circulation and corridor space, as well as an ongoing indication of necessary building area per student. It offers itemized data to illustrate variations and similarities in elementary schools, junior high/middle schools, K-12 schools, and high schools. Data were extracted from the final construction drawings of 158 educational facilities designed and constructed over the last 12 years. The paper presents general facility data and itemization of facility research data. Results show that programming percentages for the various categories can vary dramatically, depending on building systems utilized, type of building enclosure, and efficiency of the design. Based on the facilities examined, 32-38 percent should be added to net programmed areas for construction and circulation, depending on the type of building being developed. Net programmed areas should include the necessary restroom, custodial, mechanical/electrical, and food service requirements. (SM)

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PROGRAMMING

Circulation Factors

in K-12 Facilities

(UPDATED RESEARCH)

CEFPI Mini-Session

PRESENTATION

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October 21, 2002

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Ronald H. Fanning, AIA, PE, REFP

FANNING/HOWEY ASSOCIATES, INC.
1200 IRMSCHER BOULEVARD, CELINA, OHIO 45822 (888) 499.2292
www.fhai.com

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PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
Phoenix, Arizona
October 21, 2002

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PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
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INTRODUCTION AND PURPOSE

This presentation provides research data regarding the necessary space requirements for restrooms, mechanical rooms, custodial spaces, food service, construction enclosure space, and circulation and corridor space, as well as an on-going indication of necessary building area per student.

Itemized data will be presented to illustrate variations and similarities in the following categories: elementary schools, junior high/middle schools, K12 schools, and high schools.

The data was extracted from the final construction drawings of 158 educational facilities designed and constructed within the last twelve years. The presentation is directed towards educational facility planners, architects, and others involved in programming space for new facilities, and will assist in helping to assure planners of necessary space requirements prior to the architectural design process.

The goal of this presentation is to begin a dialogue between planners and architects regarding the appropriate factors to be applied to net programmed space in order to reach total building area, resulting in a more realistic budgeting process.

General Facility Data

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
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COMPARISONS OF HIGH SCHOOLS

	Name of School	State	GSF	# of Floors	# of Students	Core Capacity	SF/student
1	Marysville HS	OH	186,294	2	1,200	1,200	155
2	Williamston HS	MI	105,038	1	600	600	175
3	N.Harrison HS	IN	149,733	2	800	800	187
4	Imlay City HS	MI	131,194	2	830	900	158
5	Gaylord HS	MI	190,853	2	1,200	1,200	159
6	Dakota HS	MI	398,578	2	2,000	2,000	199
7	Dublin Scioto HS	OH	228,625	2	1,200	1,800	191
8	Brecksville BHHS	OH	293,715	3	1,800	1,800	163
9	Northridge HS	OH	95,994	1	500	500	192
10	Leslie HS	MI	131,443	1	510	650	258
11	Springboro HS	OH	217,523	2	1,200	1,600	181
12	Ocean Lakes HS*	VA	306,792	2	2,300	2,300	133
13	DeWitt HS	MI	224,067	2	1,000	1,200	224
14	Holly HS	MI	253,521	2	1,600	2,200	158
15	Northville HS	MI	362,000	2	1,680	2,200	215
16	Three Rivers HS	MI	194,563	1	850	850	229
17	Chesterton HS	IN	514,090	2	2,200	2,500	234
18	Spring Lake HS	IN	174,290	1	750	750	232
19	Perrysburg HS	OH	285,390	2	1,600	2,000	178
20	Vinton County HS	OH	131,118	1	800	800	164
21	Twinsburg HS/Fitness	OH	333,356	2	1,200	1,500	278
22	Claymont HS	OH	123,090	2	746	750	165
23	Avon HS	IN	425,000	2	1,800	1,800	236
24	Linton HS	IN	76,533	2	450	600	170
25	Greeneview HS	OH	90,950	2	550	550	165
26	Standish Sterling CHS	MI	140,450	2	900	900	156
27	Sawsville HS	VA	110,673	2	600	600	184
28	Goshen HS	OH	139,796	2	838	838	167
29	Milan HS*	MI	266,976	2	900	900	297
30	Bethel-Tate HS	OH	98,864	2	600	600	165
31	**Romeo Eng. & Tech**	MI	91,000	2	600	720	152
32	**Lima Sr. HS**	OH	284,861	2	1,356	1,356	210
33	**Glen Oaks HS**	NY	207,149	5	1,090	1,090	190
34	**HSE Freshman**	IN	243,349	2	1,000	1,000	243
35	**Olentangy HS**	OH	303,000	2	1,600	1,600	189
36	**Tippecanoe HS**	OH	185,026	2	1,000	1,200	185
37	**Blessed T.Guerin HS**	IN	165,000	1	800	800	206
38	**Pickerington HS**	OH	304,163	2	1,800	1,800	169
39	**New Lebanon HS**	OH	91,683	1	550	550	167
	AVERAGE		**211,686**		**1,103**		**192**
	AVERAGE*		**207,621**		**1,076**		**193**

*(Taking out the schools with the highest & lowest SF/student)

(Core capacity means the student capacity of the media center, cafeteria, gymnasium, etc.)

The schools in bold type were added to this year's analysis.

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COMPARISONS OF MIDDLE SCHOOLS

	Name of School	State	GSF	# of Floors	# of Students	SF/student
1	Avondale MS	MI	103,023	1	600	172
2	Meridian MS	IL	80,167	2	650	123
3	A.I.Root MS	OH	131,612	1	700	188
4	Wilson MS	IN	213,803	2	1,100	194
5	N.Oldham MS*	KY	79,504	1	700	114
6	S.Vermillion MS	IN	126,088	1	720	175
7	Discovery MS	IN	165,435	2	900	184
8	Woodridge MS	OH	79,115	1	550	144
9	Crestview MS*	IN	160,623	1	750	214
10	Lincoln MS	IN	187,922	1	900	209
11	Greyhound IS	MI	88,964	2	550	162
12	Novi MS	MI	215,055	1	1,058	203
13	HSE JHS	IN	171,100	2	1,000	171
14	Celina IS	OH	81,083	2	650	125
15	St. Johns MS	MI	127,258	1	778	164
16	S.Dearborn MS	IN	128,224	1	720	178
17	Rapid Run MS	OH	126,773	2	750	169
18	Harmon MS	OH	93,048	1	750	124
19	Diley MS	OH	95,616	1	750	127
20	Graham MS	OH	102,547	1	675	152
21	Stanton MS	OH	146,889	1	1,000	147
22	Fall Creek IS	IN	137,218	1	1,000	137
23	Sand Creek IS	IN	137,218	1	1,000	137
24	Discovery MS	MI	133,119	1	765	174
25	Franklin 5-6	IN	178,452	1	1,200	149
26	Zionsville MS	IN	249,932	2	1,600	156
27	Charlotte MS	MI	192,000	1	1,100	175
28	Lima West MS	OH	70,255	2	505	139
29	Pickerington JHS	OH	142,528	2	850	168
30	Tiffin MS	OH	103,494	2	734	141
31	Niles MS	OH	93,060	2	660	141
32	**South MS,Lima**	OH	77,253	2	504	153
33	**Hamilton IS**	IN	96,205	1	774	124
34	**Kelly Miller MS**	DC	107,546	3	600	179
35	**Blacksburg MS**	VA	190,978	2	1,200	159
36	**Christiansburg MS**	VA	168,864	2	900	188
37	**Salem MS**	NC	158,086	2	1,000	158
	AVERAGE		**133,515**		**828**	**161**
	AVERAGE*		**134,284**		**834**	**161**

*(Taking out the schools with the highest & lowest SF/student)
The schools in bold type were added to this year's analysis.

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
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COMPARISONS OF ELEMENTARY SCHOOLS

	Name of School	State	GSF	# of Floors	# of Students	SF/student
1	Horace Mann ES	IN	64,166	1	500	128
2	New Britton ES	IN	78,886	1	650	121
3	Batesville ES	IN	75,050	1	600	125
4	Knox Comm. ES	IN	83,053	1	640	130
5	Smoky Row ES	IN	91,420	1	725	126
6	Anna ES	OH	69,026	1	600	115
7	Wyandot Run ES	OH	80,130	1	650	123
8	Flint Lake ES	IN	86,436	2	600	144
9	Taylor Road ES	OH	52,430	1	525	100
10	Timmons ES	OH	90,127	1	750	120
11	Joan Martin ES	IN	87,732	1	700	125
12	Wash Irv Sch #14	IN	93,458	2	677	138
13	Schultz ES	OH	55,609	1	525	106
14	Horizon ES	IN	91,844	1	720	128
15	Lantern Rd. ES	IN	78,921	1	625	126
16	Suncrest ES	IN	81,549	1	650	125
17	Oak Hill ES	IN	71,623	1	600	119
18	Alum Creek ES	OH	82,330	1	650	127
19	Tussing ES	OH	76,492	1	650	118
20	Sabina ES	OH	55,600	1	600	93
21	New Vienna ES	OH	43,001	1	340	126
22	Columbia ES	OH	96,659	1	650	149
23	Rose Pioneer ES	MI	59,371	1	475	125
24	Union Local ES*	OH	79,478	1	900	88
25	Springfield ES	IN	72,656	1	470	155
26	Edison ES	IN	84,703	1	600	141
27	Morton ES	IN	84,703	1	600	141
28	Maywood ES	IN	87,671	1	600	146
29	Gateway North ES	MI	54,653	1	300	182
30	Oakview South ES	MI	54,653	1	300	182
31	Fishback Creek PA	IN	91,412	1	600	152
32	Buckner ES	KY	70,692	2	600	118
33	Prairie Trace ES	IN	88,742	1	725	122
34	Harrison Parkway ES	IN	78,921	1	650	121
35	Meadows Edge ES	IN	57,224	1	450	127
36	Northpoint ES	IN	57,224	1	450	127
37	Towne Meadow ES	IN	87,471	1	725	121
38	Discovery ES*	MI	79,400	1	400	199
39	Deerfield ES	MI	83,084	1	560	148
40	Cheyenne ES	MI	101,000	1	800	126
41	Scioto Ridge ES	OH	72,830	1	650	112
42	Arrowhead ES	OH	72,830	1	650	112
43	Oak Creek ES	OH	71,419	1	650	110
44	Tyler Run ES	OH	72,803	1	650	112
45	Hoosier Rd. ES	IN	78,850	1	650	121
46	S. Lebanon ES	OH	75,008	2	500	150

COMPARISONS OF ELEMENTARY SCHOOLS (cont.)

	Name of School	State	GSF	# of Floors	# of Students	SF/student
47	Kings Mills ES	OH	78,285	2	600	130
48	H.G. Blake ES	OH	75,191	1	600	125
49	Ryan Park ES	IN	78,679	1	500	157
50	Leighton ES	OH	79,978	1	700	114
51	Monroe Road ES	MI	76,360	1	700	109
52	Moreland Hills ES	OH	124,875	1	1,000	125
53	Snacks Crossing ES	IN	94,866	1	700	136
54	Auburn ES	VA	81,740	1	650	126
55	Zionsville ES	IN	88,590	2	600	148
56	Freedom ES	OH	59,469	1	500	119
57	Unity ES	OH	59,480	2	500	119
58	Montgomery ES	OH	78,675	3	625	126
59	Brooks School Elem	IN	93,333	1	700	133
60	Blue Ash ES	OH	80,821	1	625	129
61	Harrison ES	IN	119,724	1	872	137
62	South Park ES	PA	114,992	2	800	144
63	**Andrews ES**	IN	73,458	1	412	178
64	**Flint Springs ES**	IN	82,694	1	562	147
65	**Lincoln ES**	IN	84,014	1	562	149
66	**Ridge Wood ES**	MI	80,310	1	450	178
67	**Patterson ES**	DC	81,007	3	520	156
68	**Mary Beck ES**	IN	89,615	2	600	149
69	**Max Larsen ES**	MI	64,914	2	425	153
70	**Hevel ES**	MI	72,783	1	463	157
71	**Deer Meadow PS****	IN	68,020	1	378	180
72	**Crown Point ES**	IN	91,000	1	650	140
73	**Stockbridge ES**	MI	62,963	1	425	148
	AVERAGE		**78,605**		**599**	**131**
	AVERAGE*		**78,582**		**597**	**132**

*(Taking out the schools with the highest & lowest SF/student)

The school in bold type were added to this year's analysis.

** with core facilities for 600 students

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
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COMPARISONS OF K-12 SCHOOLS

	Name of School	State	GSF	# of Floors	# of Students	Core Capacity	SF/student
1	**Twin Valley South**	OH	198,890	1	1,300	1,300	153
2	**Edon Northwest PK-12**	OH	131,153	1	890	890	147
3	**Ft. Jennings PK-12**	OH	103,235	1	643	643	161
4	**Mississinawa K-12**	OH	112,585	1	750	750	150
5	**Adena K-12***	OH	189,112	1	1,414	1,414	134
6	**Riverdale K-12**	OH	164,522	1	1,174	1,174	140
7	**Morgan Township K-12***	IN	137,000	1	775	775	177
8	**New London K-12**	OH	162,485	1	1,200	1,200	135
9	**Antwerp K-12**	OH	140,135	1	982	982	143
	AVERAGE		**148,791**		**1,014**		**147**
	AVERAGE*		**144,715**		**991**		**146**

*(Taking out the schools with the highest & lowest SF/student)
(Core capacity means the student capacity of the media center, cafeteria, gymnasium, etc.)
The schools in bold type were added to this year's analysis.

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Itemization of Facility Research Data

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
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COMPARISONS OF HIGH SCHOOL SPACES

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
1	Marysville HS Ohio	**186,294** 1,200 155	2,659 2.04%	5,429 4.17%	391 0.30%	3,685 2.83%	118,003 90.66%	**130,167**	21,742 16.70%	34,385 26.42%	56,127 43.12%
2	Williamston HS Michigan	**105,038** 600 175	1,822 2.39%	3,841 5.03%	262 0.34%	3,226 4.23%	67,164 88.01%	**76,315**	7,034 9.22%	21,689 28.42%	28,723 37.64%
3	N Harrison HS Indiana	**149,733** 800 187	3,143 2.96%	6,093 5.73%	947 0.89%	3,372 3.17%	92,722 87.25%	**106,277**	10,138 9.54%	33,318 31.35%	43,456 40.89%
4	Imlay City HS Michigan	**131,194** 830 158	1,910 2.09%	3,188 3.49%	202 0.22%	4,420 4.84%	81,685 89.37%	**91,405**	12,461 13.63%	27,328 29.90%	39,789 43.53%
5	Gaylord HS Michigan	**190,853** 1,200 159	3,720 2.54%	8,562 5.84%	1,808 1.23%	4,813 3.28%	127,746 87.11%	**146,649**	11,457 7.81%	32,747 22.33%	44,204 30.14%
6	Dakota HS Michigan	**398,578** 2,000 199	8,817 3.18%	15,185 5.47%	665 0.24%	5,160 1.86%	247,705 89.25%	**277,532**	48,528 17.49%	72,518 26.13%	121,046 43.62%
7	Dublin Scioto HS Ohio	**228,625** 1,200 191	6,277 3.77%	13,886 8.34%	937 0.56%	6,195 3.72%	139,257 83.61%	**166,552**	14,700 8.83%	47,373 28.44%	62,073 37.27%
8	Brecksville BHHS Ohio	**293,715** 1,800 163	6,643 3.22%	11,352 5.49%	809 0.39%	6,033 2.92%	181,771 87.98%	**206,608**	26,801 12.97%	60,306 29.19%	87,107 42.16%
9	Northridge HS Ohio	**95,994** 500 192	2,554 3.74%	4,529 6.62%	1,172 1.71%	3,510 5.13%	56,598 82.79%	**68,363**	12,501 18.29%	15,130 22.13%	27,631 40.42%
10	Leslie HS Michigan	**131,443** 510 258	2,404 2.46%	4,592 4.70%	446 0.46%	3,203 3.28%	86,995 89.10%	**97,640**	9,642 9.88%	24,161 24.74%	33,803 34.62%
11	Springboro HS Ohio	**217,523** 1,200 181	4,541 2.99%	8,635 5.68%	900 0.59%	5,285 3.48%	132,540 87.25%	**151,901**	27,619 18.18%	38,003 25.02%	65,622 43.20%
12	Ocean Lakes HS Virginia	**306,792** 2,300 133	4,677 2.11%	7,081 3.19%	4,122 1.86%	7,094 3.20%	198,663 89.63%	**221,637**	23,154 10.45%	62,001 27.97%	85,155 38.42%
13	DeWitt HS Michigan	**224,067** 1,000 224	4,817 2.74%	12,143 6.91%	739 0.42%	4,669 2.66%	153,367 87.27%	**175,735**	11,487 6.54%	36,845 20.97%	48,332 27.50%
14	Holly HS Michigan	**253,521** 1,600 158	4,202 2.15%	10,266 5.24%	506 0.26%	3,231 1.65%	177,645 90.70%	**195,850**	11,029 5.63%	46,642 23.82%	57,671 29.45%
15	Northville HS Michigan	**362,000** 1,680 215	6,239 2.69%	10,031 4.33%	1,745 0.75%	6,034 2.61%	207,498 89.61%	**231,547**	56,194 24.27%	74,259 32.07%	130,453 56.34%
16	Three Rivers HS Michigan	**194,563** 850 229	4,069 2.71%	8,795 5.86%	2,104 1.40%	5,079 3.38%	130,059 86.64%	**150,106**	10,403 6.93%	34,054 22.69%	44,457 29.62%
17	Chesterton HS Indiana	**514,090** 2,200 234	10,994 2.82%	26,987 6.91%	1,219 0.31%	8,305 2.13%	342,834 87.83%	**390,339**	29,461 7.55%	94,290 24.16%	123,751 31.70%
18	Spring Lake HS Michigan	**174,290** 750 232	2,364 1.78%	11,366 8.56%	596 0.45%	5,380 4.05%	113,045 85.16%	**132,751**	10,492 7.90%	31,047 23.39%	41,539 31.29%
19	Perrysburg HS Ohio	**285,390** 1,600 178	6,321 3.22%	8,286 4.22%	1,436 0.73%	8,042 4.10%	172,066 87.72%	**196,151**	32,983 16.82%	56,256 28.68%	89,239 45.50%
20	Vinton County HS Ohio	**131,118** 800 164	3,047 3.19%	2,287 2.39%	243 0.25%	2,885 3.02%	87,085 91.14%	**95,547**	8,151 8.53%	27,420 28.70%	35,571 37.23%

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COMPARISONS OF HIGH SCHOOL SPACES (cont.)

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
21	Twinsburg HS/Fitness	**333,356**	6,162	22,397	1,484	4,267	205,647	**239,957**	30,659	62,740	93,399
	Ohio	1,200	2.57%	9.33%	0.62%	1.78%	85.70%		12.78%	26.15%	38.92%
		278									
22	Claymont HS	**123,090**	3,395	5,337	621	2,611	80,247	**92,211**	9,538	21,341	30,879
	Ohio	746	3.68%	5.79%	0.67%	2.83%	87.03%		10.34%	23.14%	33.49%
		165									
23	Avon HS	**425,000**	5,301	10,470	912	9,605	265,139	**291,427**	59,765	73,808	133,573
	Ohio	1,800	1.82%	3.59%	0.31%	3.30%	90.98%		20.51%	25.33%	45.83%
		236									
24	Linton HS	**76,533**	2,025	4,189	575	2,871	45,840	**55,500**	6,085	14,948	21,033
	Indiana	450	3.65%	7.55%	1.04%	5.17%	82.59%		10.96%	26.93%	37.90%
		170									
25	Greeneview HS	**90,950**	1,941	4,826	141	2,197	63,415	**72,520**	2,607	15,823	18,430
	Ohio	550	2.68%	6.65%	0.19%	3.03%	87.44%		3.59%	21.82%	25.41%
		165									
26	Standish Sterling CHS	**140,450**	2,945	7,254	979	3,486	94,070	**108,734**	10,049	21,667	31,716
	Michigan	900	2.71%	6.67%	0.90%	3.21%	86.51%		9.24%	19.93%	29.17%
		156									
27	Sawsville HS	**110,673**	2,692	3,489	530	2,550	68,537	**77,798**	11,587	21,288	32,875
	Virginia	556	3.46%	4.48%	0.68%	3.28%	88.10%		14.89%	27.36%	42.26%
		184									
28	Goshen HS	**139,796**	3,295	6,996	749	2,843	94,706	**108,589**	9,295	21,912	31,207
	Ohio	838	3.03%	6.44%	0.69%	2.62%	87.22%		8.56%	20.18%	28.74%
		167									
29	Milan HS	**266,976**	5,353	14,892	1,899	3,910	166,192	**192,246**	26,457	48,273	74,730
	Michigan	900	2.78%	7.75%	0.99%	2.03%	86.45%		13.76%	25.11%	38.87%
		297									
30	Bethel-Tate HS	**98,864**	1,888	4,749	542	3,376	65,881	**76,436**	3,376	19,052	22,428
	Ohio	600	2.47%	6.21%	0.71%	4.42%	86.19%		4.42%	24.93%	29.34%
		165									
31	Romeo Eng. & Tech	**91,000**	2,399	2,043	452	2,234	54,743	**61,871**	8,059	21,070	29,129
	Michigan	600	3.88%	3.30%	0.73%	3.61%	88.48%		13.03%	34.05%	47.08%
		152									
32	Lima Senior HS	**284,861**	5,553	15,422	3,765	4,413	189,199	**218,352**	19,141	47,368	66,509
	Ohio	1,356	2.54%	7.06%	1.72%	2.02%	86.65%		8.77%	21.69%	30.46%
		210									
33	Glen Oaks HS	**207,149**	5,230	19,202	1,778	4,250	120,932	**151,392**	22,613	33,144	55,757
	New York	1,090	3.45%	12.68%	1.17%	2.81%	79.88%		14.94%	21.89%	36.83%
		190									
34	HSE Freshman	**243,349**	4,595	14,734	2,293	8,718	129,109	**159,449**	36,107	47,793	83,900
	Indiana	1,000	2.88%	9.24%	1.44%	5.47%	80.97%		22.64%	29.97%	52.62%
		243									
35	Olentangy HS	**303,000**	6,398	17,721	474	4,326	190,711	**219,630**	21,253	62,117	83,370
	Ohio	1,600	2.91%	8.07%	0.22%	1.97%	86.83%		9.68%	28.28%	37.96%
		189									
36	Tippecanoe HS	**185,026**	4,177	6,857	719	4,231	117,731	**133,715**	16,944	34,367	51,311
	Ohio	1,000	3.12%	5.13%	0.54%	3.16%	88.05%		12.67%	25.70%	38.37%
		185									
37	Blessed T.Guerin HS	**165,000**	4,549	3,410	501	5,095	114,100	**127,655**	5,529	31,816	37,345
	Indiana	800	3.56%	2.67%	0.39%	3.99%	89.38%		4.33%	24.92%	29.25%
		206									
38	Pickerington HS	**304,163**	7,392	13,755	1,589	6,083	197,580	**226,399**	14,329	63,435	77,764
	Ohio	1,800	3.27%	6.08%	0.70%	2.69%	87.27%		6.33%	28.02%	34.35%
		169									
39	New Lebanon HS	**91,683**	2,024	4,364	345	2,248	61,151	**70,132**	6,746	14,805	21,551
	Ohio	550	2.89%	6.22%	0.49%	3.21%	87.19%		9.62%	21.11%	30.73%
		167									
	HS AVERAGE	**192**	**2.87%**	**5.97%**	**0.71%**	**3.23%**	**87.21%**		**11.54%**	**25.84%**	**37.38%**
		GSF/student	**Toilet Rm**	**M/E**	**Janitor**	**Food Svc**	**Other**		**Const**	**Circ**	**C & C**

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
Phoeniz, Arizona
October 21, 2002

COMPARISONS OF MIDDLE SCHOOL SPACES

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
1	Avondale MS	**103,023**	2,833	7,712	535	1,912	64,016	**77,008**	7,272	18,743	26,015
	Michigan	600	3.68%	10.01%	0.69%	2.48%	83.13%		9.44%	24.34%	33.78%
		172									
2	Meridian MS	**80,167**	2,268	4,752	412	1,296	51,484	**60,212**	6,922	13,033	19,955
	Illinois	650	3.77%	7.89%	0.68%	2.15%	85.50%		11.50%	21.65%	33.14%
		123									
3	A.I.Root MS	**131,612**	2,332	10,462	287	2,862	81,639	**97,582**	13,766	20,264	34,030
	Ohio	700	2.39%	10.72%	0.29%	2.93%	83.66%		14.11%	20.77%	34.87%
		188									
4	Wilson MS	**213,803**	4,023	7,653	994	5,276	141,762	**159,708**	18,795	35,300	54,095
	Indiana	1,100	2.52%	4.79%	0.62%	3.30%	88.76%		11.77%	22.10%	33.87%
		194									
5	N.Oldham MS	**79,504**	1,673	2,548	443	2,728	53,846	**61,238**	6,357	11,909	18,266
	Kentucky	700	2.73%	4.16%	0.72%	4.45%	87.93%		10.38%	19.45%	29.83%
		114									
6	S.Vermillion MS	**126,088**	3,710	6,352	520	2,629	81,941	**95,152**	9,959	20,977	30,936
	Indiana	720	3.90%	6.68%	0.55%	2.76%	86.12%		10.47%	22.05%	32.51%
		175									
7	Discovery MS	**165,435**	3,309	8,297	446	2,946	106,084	**121,082**	13,251	31,102	44,353
	Indiana	900	2.73%	6.85%	0.37%	2.43%	87.61%		10.94%	25.69%	36.63%
		184									
8	Woodridge MS	**79,115**	2,377	6,069	692	2,440	47,916	**59,494**	4,740	14,881	19,621
	Ohio	550	4.00%	10.20%	1.16%	4.10%	80.54%		7.97%	25.01%	32.98%
		144									
9	Crestview MS	**160,623**	3,517	8,830	356	3,395	100,246	**116,344**	13,034	31,245	44,279
	Indiana	750	3.02%	7.59%	0.31%	2.92%	86.16%		11.20%	26.86%	38.06%
		214									
10	Lincoln MS	**187,922**	4,144	9,416	507	4,582	128,461	**147,110**	10,458	30,354	40,812
	Indiana	900	2.82%	6.40%	0.34%	3.11%	87.32%		7.11%	20.63%	27.74%
		209									
11	Greyhound IS	**88,964**	2,435	4,405	269	3,808	53,889	**64,806**	6,322	17,836	24,158
	Michigan	550	3.76%	6.80%	0.42%	5.88%	83.15%		9.76%	27.52%	37.28%
		162									
12	Novi MS	**215,055**	4,434	11,349	1,251	4,185	135,335	**156,554**	15,210	43,291	58,501
	Michigan	1,058	2.83%	7.25%	0.80%	2.67%	86.45%		9.72%	27.65%	37.37%
		203									
13	HSE JHS	**171,100**	3,698	5,855	1,523	3,570	105,199	**119,845**	20,252	31,003	51,255
	Indiana	1,000	3.09%	4.89%	1.27%	2.98%	87.78%		16.90%	25.87%	42.77%
		171									
14	Celina IS	**81,083**	1,898	3,016	136	2,104	49,213	**56,367**	7,650	17,066	24,716
	Ohio	650	3.37%	5.35%	0.24%	3.73%	87.31%		13.57%	30.28%	43.85%
		125									
15	St. Johns MS	**127,258**	3,425	7,990	482	2,456	87,708	**102,061**	2,098	23,099	25,197
	Michigan	778	3.36%	7.83%	0.47%	2.41%	85.94%		2.06%	22.63%	24.69%
		164									
16	S.Dearborn MS	**128,224**	2,499	5,422	411	3,219	83,756	**95,307**	2,653	30,264	32,917
	Indiana	720	2.62%	5.69%	0.43%	3.38%	87.88%		2.78%	31.75%	34.54%
		178									
17	Rapid Run MS	**126,773**	3,025	7,274	411	2,789	79,750	**93,249**	11,483	22,041	33,524
	Ohio	750	3.24%	7.80%	0.44%	2.99%	85.52%		12.31%	23.64%	35.95%
		169									
18	Harmon MS	**93,048**	3,593	4,224	575	1,607	60,393	**70,392**	7,952	14,704	22,656
	Ohio	750	5.10%	6.00%	0.82%	2.28%	85.80%		11.30%	20.89%	32.19%
		124									

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COMPARISONS OF MIDDLE SCHOOL SPACES (cont.)

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
19	Diley MS	**95,616**	3,381	4,867	632	4,607	59,127	**72,614**	7,888	15,114	23,002
	Ohio	750	4.66%	6.70%	0.87%	6.34%	81.43%		10.86%	20.81%	31.68%
		127									
20	Graham MS	**102,547**	3,156	4,683	287	2,726	66,040	**76,892**	7,678	17,977	25,655
	Ohio	675	4.10%	6.09%	0.37%	3.55%	85.89%		9.99%	23.38%	33.36%
		152									
21	Stanton MS	**146,889**	2,406	9,907	518	4,704	88,242	**105,777**	11,471	29,641	41,112
	Ohio	1,000	2.27%	9.37%	0.49%	4.45%	83.42%		10.84%	28.02%	38.87%
		147									
22	Fall Creek IS	**137,218**	3,244	9,125	397	4,901	83,607	**101,274**	12,216	23,728	35,944
	Indiana	1,000	3.20%	9.01%	0.39%	4.84%	82.56%		12.06%	23.43%	35.49%
		137									
23	Sand Creek IS	**137,218**	3,604	9,125	397	4,901	83,247	**101,274**	12,216	23,728	35,944
	Indiana	1,000	3.56%	9.01%	0.39%	4.84%	82.20%		12.06%	23.43%	35.49%
		137									
24	Discovery MS	**133,119**	2,673	6,896	550	3,868	81,986	**95,973**	11,442	25,704	37,146
	Michigan	765	2.79%	7.19%	0.57%	4.03%	85.43%		11.92%	26.78%	38.70%
		174									
25	Franklin 5-6	**178,452**	4,602	13,735	780	4,140	105,716	**128,973**	13,337	36,142	49,479
	Indiana	1,200	3.57%	10.65%	0.60%	3.21%	81.97%		10.34%	28.02%	38.36%
		149									
26	Zionsville MS	**249,932**	4,248	19,751	510	5,941	151,462	**181,912**	17,191	50,829	68,020
	Indiana	1,600	2.34%	10.86%	0.28%	3.27%	83.26%		9.45%	27.94%	37.39%
		156									
27	Charlotte MS	**192,000**	4,159	10,043	990	4,268	123,919	**143,379**	14,915	33,706	48,621
	Michigan	1,100	2.90%	7.00%	0.69%	2.98%	86.43%		10.40%	23.51%	33.91%
		175									
28	Lima West MS	**70,255**	1,566	2,935	454	1,884	45,213	**52,052**	6,023	12,180	18,203
	Ohio	505	3.01%	5.64%	0.87%	3.62%	86.86%		11.57%	23.40%	34.97%
		139									
29	Pickerington JHS	**142,528**	3,787	5,070	469	1,759	87,838	**98,923**	13,585	30,020	43,605
	Ohio	850	3.83%	5.13%	0.47%	1.78%	88.79%		13.73%	30.35%	44.08%
		168				satellite					
30	Tiffin MS	**103,494**	2,511	3,587	313	2,668	68,807	**77,886**	6,614	18,994	25,608
	Ohio	734	3.22%	4.61%	0.40%	3.43%	88.34%		8.49%	24.39%	32.88%
		141									
31	Niles MS	**93,060**	2,696	2,902	618	2,603	61,523	**70,342**	10,493	12,225	22,718
	Ohio	660	3.83%	4.13%	0.88%	3.70%	87.46%		14.92%	17.38%	32.30%
		141									
32	South MS	**77,253**	1,309	3,278	480	1,917	50,119	**57,103**	6,380	13,770	20,150
	Ohio	504	2.29%	5.74%	0.84%	3.36%	87.77%		11.17%	24.11%	35.29%
		153									
33	Hamilton IS	**96,205**	2,604	5,412	373	2,746	61,857	**72,992**	8,872	14,341	23,213
	Indiana	774	3.57%	7.41%	0.51%	3.76%	84.74%		12.15%	19.65%	31.80%
		124									
34	Kelly Miller MS	**107,546**	3,541	4,071	539	1,973	70,037	**80,161**	6,940	20,445	27,385
	District of Columbia	600	4.42%	5.08%	0.67%	2.46%	87.37%		8.66%	25.50%	34.16%
		179									
35	Blacksburg MS	**190,978**	4,916	9,920	490	4,611	117,359	**137,296**	13,218	40,464	53,682
	Virginia	1,200	3.58%	7.23%	0.36%	3.36%	85.48%		9.63%	29.47%	39.10%
		159									
36	Christiansburg MS	**168,864**	3,545	9,779	490	4,611	102,424	**120,849**	15,936	32,079	48,015
	Virginia	900	2.93%	8.09%	0.41%	3.82%	84.75%		13.19%	26.54%	39.73%
		188									
37	Salem MS	**148,086**	3,876	6,699	658	2,451	90,003	**103,687**	17,824	26,575	44,399
	North Carolina	1,000	3.74%	6.46%	0.63%	2.36%	86.80%		17.19%	25.63%	42.82%
		148									
	MS AVERAGE	**161**	**3.32%**	**7.09%**	**0.58%**	**3.41%**	**85.61%**		**10.53%**	**24.61%**	**35.47%**
		GSF/student	**Toilet Rm**	**M/E**	**Janitor**	**Food Svc**	**Other**		**Const**	**Circ**	**C & C**

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
Phoeniz, Arizona
October 21, 2002

COMPARISONS OF ELEMENTARY SCHOOL SPACES

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
1	Horace Mann ES	**64,166**	1,394	2,071	454	1,732	42,041	**47,692**	3,382	13,092	16,474
	Indiana	500	2.92%	4.34%	0.95%	3.63%	88.15%		7.09%	27.45%	34.54%
		128									
2	New Britton ES	**78,886**	2,032	3,120	366	2,245	51,217	**58,980**	6,302	13,604	19,906
	Indiana	650	3.45%	5.29%	0.62%	3.81%	86.84%		10.68%	23.07%	33.75%
		121									
3	Batesville ES	**75,050**	1,994	2,656	346	1,802	47,895	**54,693**	5,765	14,592	20,357
	Indiana	600	3.65%	4.86%	0.63%	3.29%	87.57%		10.54%	26.68%	37.22%
		125									
4	Knox Comm. ES	**83,053**	2,260	5,183	125	957	54,482	**63,007**	5,595	14,451	20,046
	Indiana	640	3.59%	8.23%	0.20%	1.52%	86.47%		8.88%	22.94%	31.82%
		130									
5	Smoky Row ES	**91,420**	2,174	2,726	571	2,998	57,359	**65,828**	6,921	18,671	25,592
	Indiana	725	3.30%	4.14%	0.87%	4.55%	87.13%		10.51%	28.36%	38.88%
		126									
6	Anna ES	**69,026**	1,571	3,334	172	1,660	43,571	**50,308**	7,274	11,444	18,718
	Ohio	600	3.12%	6.63%	0.34%	3.30%	86.61%		14.46%	22.75%	37.21%
		115									
7	Wyandot Run ES	**80,130**	1,797	2,545	455	2,023	49,973	**56,793**	8,080	15,257	23,337
	Ohio	650	3.16%	4.48%	0.80%	3.56%	87.99%		14.23%	26.86%	41.09%
		123									
8	Flint Lake ES	**86,436**	2,615	5,740	508	1,932	52,362	**63,157**	6,212	17,067	23,279
	Indiana	600	4.14%	9.09%	0.80%	3.06%	82.91%		9.84%	27.02%	36.86%
		144									
9	Taylor Road ES	**52,430**	1,196	2,522	361	1,444	34,706	**40,229**	3,137	9,064	12,201
	Ohio	525	2.97%	6.27%	0.90%	3.59%	86.27%		7.80%	22.53%	30.33%
		100									
10	Timmons ES	**90,127**	2,433	5,738	238	2,133	60,994	**71,536**	4,662	13,929	18,591
	Ohio	750	3.40%	8.02%	0.33%	2.98%	85.26%		6.52%	19.47%	25.99%
		120									
11	Joan Martin ES	**87,732**	2,250	7,356	457	3,049	50,861	**63,973**	8,249	15,510	23,759
	Indiana	700	3.52%	11.50%	0.71%	4.77%	79.50%		12.89%	24.24%	37.14%
		125									
12	WashIrvSch#14	**93,458**	2,338	4,072	618	794	62,564	**70,386**	9,501	13,571	23,072
	Indiana	677	3.32%	5.79%	0.88%	1.13%	88.89%		13.50%	19.28%	32.78%
		138									
13	Schultz ES	**55,609**	1,638	1,519	109	1,687	37,804	**42,757**	4,703	8,149	12,852
	Ohio	525	3.83%	3.55%	0.25%	3.95%	88.42%		11.00%	19.06%	30.06%
		106									
14	Horizon ES	**91,844**	1,916	6,398	237	1,362	56,893	**66,806**	7,078	17,960	25,038
	Indiana	720	2.87%	9.58%	0.35%	2.04%	85.16%		10.59%	26.88%	37.48%
		128									
15	Lantern Rd. ES	**78,921**	1,939	3,318	324	1,950	53,775	**61,306**	5,990	11,625	17,615
	Indiana	625	3.16%	5.41%	0.53%	3.18%	87.72%		9.77%	18.96%	28.73%
		126									
16	Suncrest ES	**81,549**	2,330	3,300	350	2,620	53,231	**61,831**	6,398	13,320	19,718
	Indiana	650	3.77%	5.34%	0.57%	4.24%	86.09%		10.35%	21.54%	31.89%
		125									
17	Oak Hill ES	**71,623**	2,000	2,859	320	2,300	48,517	**55,996**	5,023	10,604	15,627
	Indiana	600	3.57%	5.11%	0.57%	4.11%	86.64%		8.97%	18.94%	27.91%
		119									
18	Alum Creek ES	**82,330**	1,964	2,555	460	1,968	53,379	**60,326**	8,544	13,460	22,004
	Ohio	650	3.26%	4.24%	0.76%	3.26%	88.48%		14.16%	22.31%	36.48%
		127									

COMPARISONS OF ELEMENTARY SCHOOL SPACES (cont.)

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
19	Tussing ES Ohio	**76,492** 650 118	2,297 4.04%	3,831 6.75%	457 0.80%	1,571 2.77%	48,634 85.64%	**56,790**	8,259 14.54%	11,443 20.15%	19,702 34.69%
20	Sabina ES Ohio	**55,600** 600 93	1,505 3.68%	1,951 4.77%	422 1.03%	2,097 5.13%	34,938 85.40%	**40,913**	5,035 12.31%	9,652 23.59%	14,687 35.90%
21	New Vienna ES Ohio	**43,001** 340 126	1,250 3.94%	1,632 5.14%	532 1.67%	1,626 5.12%	26,724 84.13%	**31,764**	3,902 12.28%	7,335 23.09%	11,237 35.38%
22	Columbia ES Ohio	**96,659** 650 149	2,796 3.74%	3,121 4.17%	208 0.28%	3,439 4.60%	65,259 87.22%	**74,823**	7,041 9.41%	14,795 19.77%	21,836 29.18%
23	Holly ES Michigan	**59,371** 475 125	1,948 4.24%	1,932 4.21%	315 0.69%	1,142 2.49%	40,598 88.38%	**45,935**	3,057 6.66%	10,379 22.59%	13,436 29.25%
24	Union Local ES Ohio	**79,478** 900 88	2,043 3.42%	2,003 3.35%	153 0.26%	1,803 3.02%	53,795 89.96%	**59,797**	8,009 13.39%	11,672 19.52%	19,681 32.91%
25	Springfield ES Indiana	**72,656** 470 155	1,825 3.16%	4,552 7.89%	275 0.48%	2,072 3.59%	48,980 84.88%	**57,704**	6,216 10.77%	11,757 20.37%	17,973 31.15%
26	Edison ES Indiana	**84,703** 600 141	3,248 5.09%	4,775 7.49%	255 0.40%	3,182 4.99%	52,302 82.03%	**63,762**	6,770 10.62%	14,171 22.22%	20,941 32.84%
27	Morton ES Indiana	**84,703** 600 141	3,248 5.09%	4,775 7.49%	255 0.40%	3,182 4.99%	52,302 82.03%	**63,762**	6,770 10.62%	14,171 22.22%	20,941 32.84%
28	Maywood ES Indiana	**87,671** 600 146	2,972 4.68%	6,734 10.61%	345 0.54%	2,706 4.26%	50,721 79.90%	**63,478**	9,931 15.64%	14,262 22.47%	24,193 38.11%
29	Gateway North ES Michigan	**54,653** 300 182	2,196 4.92%	2,941 6.59%	145 0.33%	931 2.09%	38,396 86.07%	**44,609**	1,314 2.95%	8,730 19.57%	10,044 22.52%
30	Oakview South ES Michigan	**54,653** 300 182	2,196 4.92%	2,941 6.59%	145 0.33%	931 2.09%	38,396 86.07%	**44,609**	1,314 2.95%	8,730 19.57%	10,044 22.52%
31	Fishback Creek PA Indiana	**91,412** 600 152	2,056 3.11%	5,766 8.71%	285 0.43%	2,615 3.95%	55,470 83.80%	**66,192**	7,864 11.88%	17,356 26.22%	25,220 38.10%
32	Buckner ES Kentucky	**70,692** 600 118	2,009 4.08%	3,807 7.72%	146 0.30%	1,246 2.53%	42,074 85.37%	**49,282**	9,021 18.30%	12,389 25.14%	21,410 43.44%
33	Prairie Trace ES Indiana	**88,742** 725 122	2,034 2.99%	6,396 9.40%	327 0.48%	1,514 2.23%	57,761 84.90%	**68,034**	7,989 11.74%	12,719 18.70%	20,708 30.44%
34	Harrison Parkway ES Indiana	**78,921** 650 121	2,020 3.30%	3,293 5.38%	277 0.45%	2,195 3.58%	53,454 87.29%	**61,239**	6,177 10.09%	11,505 18.79%	17,682 28.87%
35	Meadows Edge ES Indiana	**57,224** 450 127	1,383 3.05%	5,636 12.42%	399 0.88%	1,503 3.31%	36,467 80.35%	**45,388**	4,383 9.66%	7,453 16.42%	11,836 26.08%
36	Northpoint ES Indiana	**57,224** 450 127	1,383 3.05%	5,636 12.42%	399 0.88%	1,503 3.31%	36,467 80.35%	**45,388**	4,383 9.66%	7,453 16.42%	11,836 26.08%

COMPARISONS OF ELEMENTARY SCHOOL SPACES (cont.)

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
37	Towne Meadow ES	**87,471**	2,044	6,803	117	1,716	59,733	**70,413**	4,566	12,492	17,058
	Indiana	725	2.90%	9.66%	0.17%	2.44%	84.83%		6.48%	17.74%	24.23%
		121									
38	Discovery ES	**79,400**	2,319	3,623	384	1,280	49,940	**57,546**	5,202	16,652	21,854
	Michigan	400	4.03%	6.30%	0.67%	2.22%	86.78%		9.04%	28.94%	37.98%
		199									
39	Deerfield ES	**83,084**	2,720	4,878	556	1,448	54,579	**64,181**	7,455	11,448	18,903
	Michigan	560	4.24%	7.60%	0.87%	2.26%	85.04%		11.62%	17.84%	29.45%
		148									
40	Cheyenne ES	**101,000**	3,029	3,656	232	1,713	69,700	**78,330**	5,686	16,984	22,670
	Michigan	800	3.87%	4.67%	0.30%	2.19%	88.98%		7.26%	21.68%	28.94%
		126									
41	Scioto Ridge ES	**72,830**	1,463	2,532	473	2,747	46,557	**53,772**	6,566	12,492	19,058
	Ohio	650	2.72%	4.71%	0.88%	5.11%	86.58%		12.21%	23.23%	35.44%
		112									
42	Arrowhead ES	**72,830**	1,463	2,532	473	2,747	46,557	**53,772**	6,566	12,492	19,058
	Ohio	650	2.72%	4.71%	0.88%	5.11%	86.58%		12.21%	23.23%	35.44%
		112									
43	Oak Creek ES	**71,419**	1,506	3,418	222	2,069	46,474	**53,689**	4,473	13,257	17,730
	Ohio	650	2.81%	6.37%	0.41%	3.85%	86.56%		8.33%	24.69%	33.02%
		110									
44	Tyler Run ES	**72,803**	1,506	3,418	222	2,069	47,858	**55,073**	4,473	13,257	17,730
	Ohio	650	2.73%	6.21%	0.40%	3.76%	86.90%		8.12%	24.07%	32.19%
		112									
45	Hoosier Rd. ES	**78,850**	2,462	3,293	290	2,195	53,703	**61,943**	5,983	10,924	16,907
	Indiana	650	3.97%	5.32%	0.47%	3.54%	86.70%		9.66%	17.64%	27.29%
		121									
46	South Lebanon ES	**75,008**	1,801	6,458	308	1,735	44,180	**54,482**	6,854	13,672	20,526
	Ohio	500	3.31%	11.85%	0.57%	3.18%	81.09%		12.58%	25.09%	37.67%
		150									
47	Kings Mills ES	**78,285**	2,516	5,649	206	1,663	49,030	**59,064**	7,133	12,088	19,221
	Ohio	600	4.26%	9.56%	0.35%	2.82%	83.01%		12.08%	20.47%	32.54%
		130									
48	H.G. Blake ES	**75,191**	2,324	5,654	723	2,285	43,504	**54,490**	5,080	15,621	20,701
	Ohio	600	4.27%	10.38%	1.33%	4.19%	79.84%		9.32%	28.67%	37.99%
		125									
49	Ryan Park ES	**78,679**	2,237	5,033	204	2,796	46,516	**56,786**	6,008	15,885	21,893
	Indiana	500	3.94%	8.86%	0.36%	4.92%	81.91%		10.58%	27.97%	38.55%
		157									
50	Leighton ES	**79,978**	1,894	3,975	325	2,460	53,923	**62,577**	4,171	13,230	17,401
	Ohio	700	3.03%	6.35%	0.52%	3.93%	86.17%		6.67%	21.14%	27.81%
		114									
51	Monroe Road ES	**76,360**	2,026	4,499	150	1,289	48,600	**56,564**	6,161	13,635	19,796
	Michigan	700	3.58%	7.95%	0.27%	2.28%	85.92%		10.89%	24.11%	35.00%
		109			(satellite only)						
52	Moreland Hills ES	**124,875**	3,937	7,768	386	1,233	74,621	**87,945**	15,419	21,511	36,930
	Ohio	1,000	4.48%	8.83%	0.44%	1.40%	84.85%		17.53%	24.46%	41.99%
		125			(satellite only)						
53	Snacks Crossing ES	**94,866**	2,832	4,103	322	2,830	61,002	**71,089**	7,120	16,657	23,777
	Indiana	700	3.98%	5.77%	0.45%	3.98%	85.81%		10.02%	23.43%	33.45%
		136									
54	Auburn ES	**81,740**	2,300	3,134	458	2,744	53,415	**62,051**	7,420	12,269	19,689
	Virginia	650	3.71%	5.05%	0.74%	4.42%	86.08%		11.96%	19.77%	31.73%
		126									
55	Zionsville ES	**88,590**	2,235	7,615	375	2,614	52,081	**64,920**	7,477	16,193	23,670
	Indiana	600	3.44%	11.73%	0.58%	4.03%	80.22%		11.52%	24.94%	36.46%
		148									

COMPARISONS OF ELEMENTARY SCHOOL SPACES (cont.)

56	Freedom ES	**59,469**	1,699	3,081	450	1,978	38,650	**45,858**	5,598	8,013	13,611
	Ohio	500	3.70%	6.72%	0.98%	4.31%	84.28%		12.21%	17.47%	29.68%
		119									
57	Unity ES	**59,480**	1,570	2,516	320	1,852	38,739	**44,997**	5,692	8,791	14,483
	Ohio	500	3.49%	5.59%	0.71%	4.12%	86.09%		12.65%	19.54%	32.19%
		119									
58	Montgomery ES	**78,675**	1,653	3,535	293	1,678	49,649	**56,808**	8,511	13,356	21,867
	Ohio	625	2.91%	6.22%	0.52%	2.95%	87.40%		14.98%	23.51%	38.49%
		126									
59	Brooks School Elem	**93,333**	2,916	2,539	296	2,356	60,249	**68,356**	8,182	16,795	24,977
	Indiana	700	4.27%	3.71%	0.43%	3.45%	88.14%		11.97%	24.57%	36.54%
		133									
60	Blue Ash ES	**80,821**	2,249	5,997	191	1,975	54,325	**64,737**	3,690	12,394	16,084
	Ohio	625	3.47%	9.26%	0.30%	3.05%	83.92%		5.70%	19.15%	24.85%
		129									
61	Harrison ES	**119,724**	3,580	6,227	532	3,206	71,714	**85,259**	9,378	25,087	34,465
	Indiana	872	4.20%	7.30%	0.62%	3.76%	84.11%		11.00%	29.42%	40.42%
		137									
62	South Park ES	**114,992**	4,420	7,449	331	2,891	65,708	**80,799**	8,888	25,305	34,193
	Pennsylvania	800	5.47%	9.22%	0.41%	3.58%	81.32%		11.00%	31.32%	42.32%
		144									
63	Andrews ES	**73,458**	1,989	4,646	549	2,256	42,821	**52,261**	5,415	15,782	21,197
	Indiana	412	3.81%	8.89%	1.05%	4.32%	81.94%		10.36%	30.20%	40.56%
		178									
64	Flint Springs ES	**82,694**	2,073	4,646	549	2,256	50,059	**59,583**	5,991	17,120	23,111
	Indiana	562	3.48%	7.80%	0.92%	3.79%	84.02%		10.05%	28.73%	38.79%
		147									
65	Lincoln ES	**84,014**	2,073	4,646	549	2,256	51,379	**60,903**	5,991	17,120	23,111
	Indiana	562	3.40%	7.63%	0.90%	3.70%	84.36%		9.84%	28.11%	37.95%
		149									
66	Ridge Wood ES	**80,310**	2,719	4,204	496	1,239	52,948	**61,606**	3,957	14,747	18,704
	Michigan	450	4.41%	6.82%	0.81%	2.01%	85.95%		6.42%	23.94%	30.36%
		178									
67	Patterson ES	**81,007**	3,162	4,633	387	1,050	55,800	**65,032**	1,438	14,537	15,975
	District of Columbia	520	4.86%	7.12%	0.60%	1.61%	85.80%		2.21%	22.35%	24.56%
		156									
68	Mary Beck ES	**89,615**	2,697	3,840	252	1,344	57,035	**65,168**	7,921	16,526	24,447
	Indiana	600	4.14%	5.89%	0.39%	2.06%	87.52%		12.15%	25.36%	37.51%
		149									
69	Max Larsen ES	**64,914**	2,010	3,570	750	812	40,829	**47,971**	4,340	12,603	16,943
	Michigan	425	4.19%	7.44%	1.56%	1.69%	85.11%		9.05%	26.27%	35.32%
		153									
70	Hevel ES	**72,783**	2,471	6,339	472	1,109	42,852	**53,243**	7,291	12,249	19,540
	Michigan	463	4.64%	11.91%	0.89%	2.08%	80.48%		13.69%	23.01%	36.70%
		157									
71	Deer Meadow PS**	**68,020**	1,660	4,400	469	2,410	38,440	**47,379**	8,725	11,916	20,641
	Indiana	378	3.50%	9.29%	0.99%	5.09%	81.13%		18.42%	25.15%	43.57%
	**core facilities for 600	180									
72	Crown Point ES	**91,000**	2,250	7,356	441	3,065	50,875	**63,987**	11,503	15,510	27,013
	Indiana	650	3.52%	11.50%	0.69%	4.79%	79.51%		17.98%	24.24%	42.22%
		140									
73	Stockbridge ES	**62,963**	1,938	4,492	531	1,238	41,590	**49,789**	2,133	11,041	13,174
	Michigan	425	3.89%	9.02%	1.07%	2.49%	83.53%		4.28%	22.18%	26.46%
		148									
	ES AVERAGE	**131**	**3.71%**	**7.21%**	**0.63%**	**3.40%**	**85.05%**		**10.65%**	**23.00%**	**33.65%**
		GSF/student	**Toilet Rm**	**M/E**	**Janitor**	**Food Svc**	**Other**		**Const**	**Circ**	**C & C**

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
Phoeniz, Arizona
October 21, 2002

COMPARISONS OF K-12 SCHOOL SPACES

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
1	Twin Valley South	**198,890**	3,686	14,849	894	4,512	134,893	**158,834**	13,768	26,288	40,056
	Ohio	1,300	2.32%	9.35%	0.56%	2.84%	84.93%		8.67%	16.55%	25.22%
		153									
2	Edon Northwest	**131,153**	3,313	5,882	502	3,073	85,183	**97,953**	10,247	22,953	33,200
	Ohio	890	3.38%	6.00%	0.51%	3.14%	86.96%		10.46%	23.43%	33.89%
		147									
3	Ft. Jennings	**103,235**	2,195	5,173	144	3,519	69,132	**80,163**	6,186	16,886	23,072
	Ohio	643	2.74%	6.45%	0.18%	4.39%	86.24%		7.72%	21.06%	28.78%
		161									
4	Mississinawa	**112,585**	2,718	5,245	212	2,462	73,627	**84,264**	8,672	19,649	28,321
	Ohio	750	3.23%	6.22%	0.25%	2.92%	87.38%		10.29%	23.32%	33.61%
		150									
5	Adena	**189,112**	3,351	2,270	266	4,577	127,277	**137,741**	15,557	35,814	51,371
	Ohio	700	2.43%	1.65%	0.19%	3.32%	92.40%		11.29%	26.00%	37.30%
		270		no mezz - all rooftop							
6	Riverdale	**164,522**	4,155	8,246	758	4,177	108,395	**125,731**	11,244	27,547	38,791
	Ohio	720	3.30%	6.56%	0.60%	3.32%	86.21%		8.94%	21.91%	30.85%
		229									
7	Morgan Township	**137,000**	4,108	2,924	551	2,518	91,992	**102,093**	11,862	23,045	34,907
	Indiana	775	4.02%	2.86%	0.54%	2.47%	90.11%		11.62%	22.57%	34.19%
		177		1 mezz							
8	New London	**162,485**	4,906	4,630	776	3,870	106,829	**121,011**	13,533	27,941	41,474
	Ohio	1,200	4.05%	3.83%	0.64%	3.20%	88.28%		11.18%	23.09%	34.27%
		135		1 mezz							
9	Antwerp	**140,135**	3,416	6,723	576	3,412	91,368	**105,495**	12,738	21,902	34,640
	Ohio	982	3.24%	6.37%	0.55%	3.23%	86.61%		12.07%	20.76%	32.84%
		143									
	MS AVERAGE	**168**	**3.19%**	**5.48%**	**0.45%**	**3.20%**	**87.68%**		**10.25%**	**22.08%**	**32.33%**
		GSF/student	**Toilet Rm**	**M/E**	**Janitor**	**Food Svc**	**Other**		**Const**	**Circ**	**C & C**

Summary of Findings

SUMMARY OF FINDINGS

Many times in the initial design phase of new educational facilities, we are faced with a shortage of square footage as the building design progresses. The net programmed area has been determined and various factors have been applied to compensate for support, construction, and circulation space. As the design evolves, it becomes apparent that we are facing a square footage overrun in relation to the budget.

In the interest of continuing to support our colleagues, Fanning/Howey Associates, Inc. continued post-construction analysis of recent educational facility designs and tabulated the findings. The data was extracted from the final construction drawings of 158 educational facilities designed and constructed within the last twelve years.

The purpose of this research is to provide architects and educational planners with hard data regarding the necessary space requirements for restrooms, mechanical rooms, custodial spaces, food service, construction enclosure space, and circulation and corridor space. The end result of the analysis will suggest a rationale for the development of educational specifications and building programming activities. The data also provides a general indication of average required square feet per student.

Itemized data was developed that illustrates variations and similarities in the following categories: elementary schools, junior high/middle schools, K12 schools, and high schools. The data shown represents tabulations from 73 elementary schools, 37 middle schools, 9 K12 schools, and 39 high schools. Elementary schools ranged in size from 300 to 1,000 students; junior high/middle schools ranged in size from 504 to 1,600 students; k12 schools ranged in size from 643 to 1,300 students, and high schools ranged in size from 500 to 2,300 students.

BUILDING SIZE RANGES

Building size in area per student can be summarized as follows:

SF / student	Elementary Schools	Middle Schools	K12 Schools	High School
Low	88	114	134	133
High	199	214	177	297
Average*	132	161	146	193

* Taking out the schools with the highest and lowest SF/student

BUILDING AREA ANALYSIS

The following ranges were noted (as a percentage of net programmed area):

	Elementary Schools	Middle Schools	K12 Schools	High Schools
Restrooms	2.73 - 5.47	2.27 - 5.10	2.32 – 4.05	1.78 - 3.88
Mechanical/Electrical	3.35 - 12.42	4.13 - 10.86	1.65 – 9.35	2.39 – 12.68
Custodial	0.17 - 1.67	0.24 - 1.27	.18 - .64	0.19 - 1.86
Food Service	1.13 - 5.13	1.78 - 6.34	2.47 – 4.39	1.65 - 5.47
Construction	2.21 - 18.42	2.06 – 17.19	7.72 – 12.07	3.59- 24.27
Circulation	16.42 – 31.32	17.38 - 31.75	16.55 – 26.00	19.93 - 32.07

The following averages were noted (as a percentage of net programmed area):

	Elementary Schools	Middle Schools	K12 Schools	High Schools
Restrooms	3.71	3.32	3.19	2.87
Mechanical/Electrical	7.21	7.09	5.48	5.97
Custodial	0.63	0.58	.45	0.71
Food Service	3.40	3.41	3.20	3.23
Construction	10.65	10.53	10.25	11.54
Circulation	23.00	24.61	22.08	25.84
Total	**48.60**	**49.54**	**44.65**	**50.16**

The areas shown begin to suggest that programming percentages for the various categories can vary dramatically, depending on building systems utilized and the type of building enclosure, as well as the efficiency of the design. We realize that geography and owner needs also affect the square footage requirements. Perhaps a more accurate analysis would involve inclusion of necessary restrooms, mechanical/electrical spaces, custodial needs, and food service requirements in the net programmed area.

The total percentages of net area for circulation and construction would calculate as follows:

	Elementary Schools	Middle Schools	K12 Schools	High Schools
Construction	10.65	10.53	10.25	11.54
Circulation	23.00	24.61	22.08	25.84
Total	**33.65**	**35.14**	**32.33**	**37.38**

Based on the facilities examined, it would appear that 32% - 38% should be added to net programmed areas for construction and circulation, depending on the type of building being developed (Gross SF = 1.39 times the net SF; or Net SF = .719 times the gross SF). [1/1.38 = .719] Net programmed areas should include the necessary restroom, custodial, mechanical/electrical, and food service requirements.

BUILDING SIZE RANGE EXAMPLE PROJECTS

CATEGORIES	NAME	SF/STUDENT	CAPACITY
High Schools			
Low	Ocean Lakes HS, VA	133	2,300
High	Milan HS, MI	297	900
Average*	Northridge HS, OH	192	500
Middle Schools			
Low	North Oldham MS, KY	114	700
High	Crestview MS, IN	214	750
Average*	Greyhound Int. School, IN	162	550
Elementary Schools			
Low	Union Local ES, OH	88	900
High	Discovery ES, MI	199	400
Average*	Brooks School Elem, IN	133	700
K12 Schools			
Low	Adena, OH	134	1,414
High	Morgan Township, IN	177	775
Average*	Edon Northwest, OH	146	890

(*Taking out the schools with the highest and lowest SF/student)

As more data is entered into our database, we will update and revise the percentages. We would also welcome information from other design firms regarding this subject.

VALIDATION OF FINDINGS

Fanning/Howey Associates, Inc. first began tracking this information in 1996. At that time, only **40** school buildings were analyzed. This number grew to 60 buildings in 1997, 74 buildings in 1998, 87 buildings in 1999, 107 buildings in 2000, 123 buildings in 2001, and **158** buildings in 2002. Below are comparisons of the findings from each year.

Building size in area per student for each year can be summarized for high schools as follows:

HIGH SCHOOLS

SF/Stud.	'96	'97	'98	'99	'00	'01	'02
Low	155	133	133	133	133	133	133
High	258	2582	258	278	278	278	297
Average	184	181	193*	193*	191*	188*	193*
The following averages were noted for each year (as a percentage of net programmed area):							
Rest	2.92	2.82	2.58	2.73	2.79	2.79	2.87
Mech/ Elect	5.61	5.17	5.64	5.52	5.64	5.76	5.97
Cust	0.56	0.73	0.70	0.65	0.66	0.67	0.71
Food Svc	3.19	3.22	3.19	3.19	3.26	3.24	3.23
Const	12.80	12.97	11.43	12.49	12.07	11.54	11.54
Circ	26.98	26.94	25.92	26.14	25.82	25.58	25.84
Total	52.06	51.85	49.46	50.72	50.24	49.58	50.16

* The schools with the highest and lowest SF/student were taken out.

Building size in area per student for each year can be summarized for middle schools as follows:

MIDDLE SCHOOLS

SF/Stud.	'96	'97	'98	'99	'00	'01	'02
Low	114	114	114	114	114	114	114
High	209	209	214	214	214	214	214
Average	172	169	163*	163*	162*	161*	161*
The following averages were noted for each year (as a percentage of net programmed area):							
Rest	3.07	3.12	3.32	3.31	3.28	3.30	3.32
Mech/ Elect	6.33	6.28	7.25	7.26	7.53	7.17	7.09
Cust	0.49	0.55	0.57	0.57	0.55	0.58	0.58
Food Svc	3.05	3.17	3.52	3.54	3.52	3.45	3.41
Const	11.35	12.76	10.52	10.42	10.42	10.64	10.53
Circ	23.76	25.12	24.23	24.36	24.64	24.50	24.61
Total	48.05	51.00	49.41	49.46	49.94	49.64	49.54

* The schools with the highest and lowest SF/student were taken out.

Building size in area per student for each year can be summarized for elementary schools as follows:

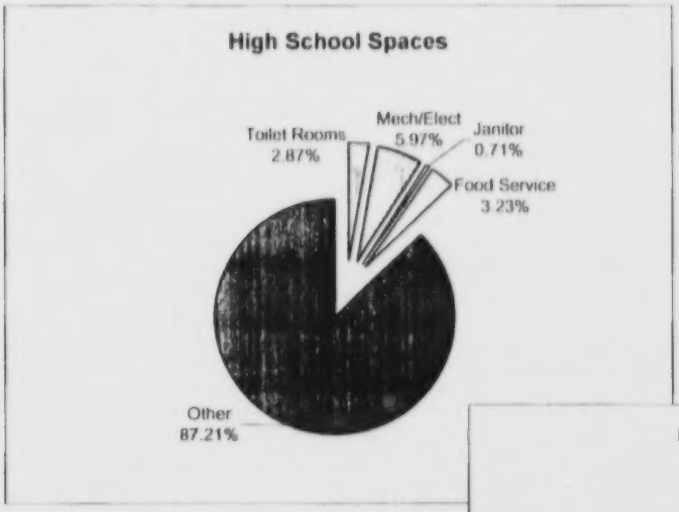
ELEMENTARY SCHOOLS

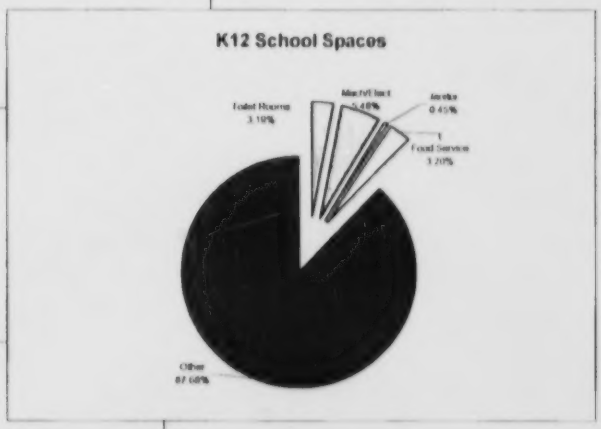
SF/ Student	'96	'97	'98	'99	'00	'01	'02
Low	88	88	88	88	88	88	88
High	144	182	190	199	199	199	199
Average	120	128	125*	128*	126*	132*	132*
The following averages were noted for each year (as a percentage of net programmed area):							
Rest	3.46	3.70	3.69	3.66	3.63	3.66	3.71
Mech/ Elect	5.73	6.30	6.41	6.78	6.91	6.98	7.21
Cust	0.64	0.55	0.59	0.59	0.59	0.59	0.63
Food Svc	3.32	3.44	3.45	3.33	3.44	3.47	3.40
Const	11.33	12.13	11.05	10.49	10.59	10.69	10.65
Circ	21.74	21.69	22.42	22.03	22.40	22.57	23.00
Total	46.22	47.81	47.61	46.88	47.56	47.96	48.60

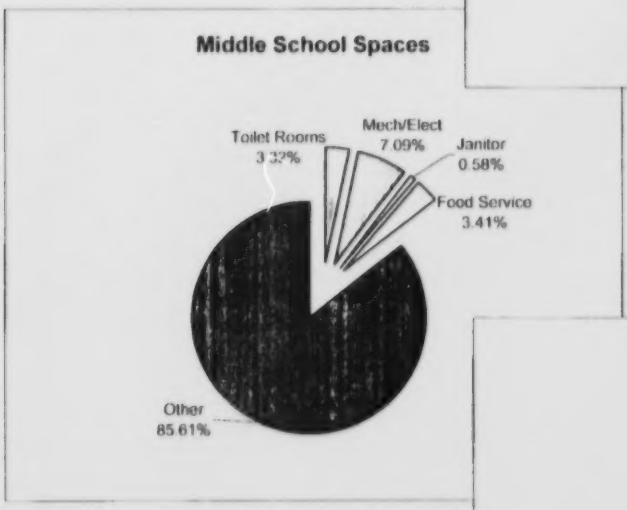
* The schools with the highest and lowest SF/student were taken out.

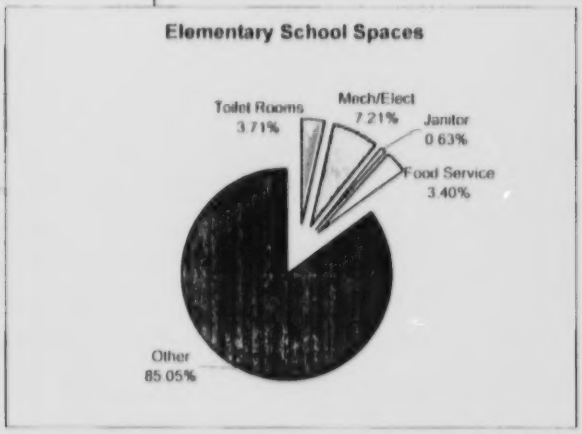
Although there was an increase of 118 buildings in the analysis, the averages and findings are very similar. This shows that the additional information confirms the original information.

Comparisons of NET Spaces in Educational Facilities

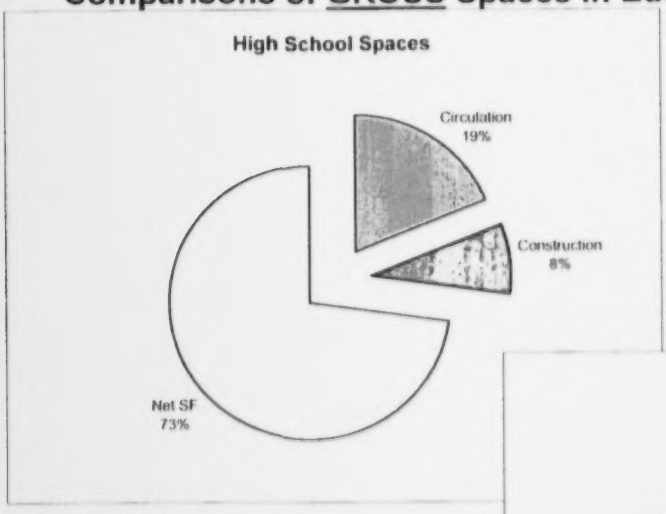


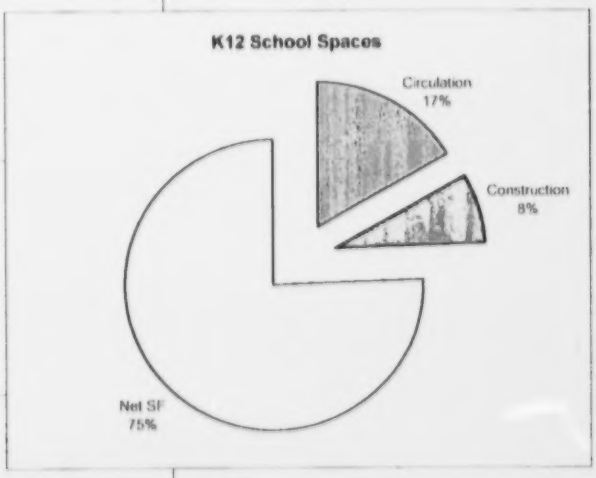


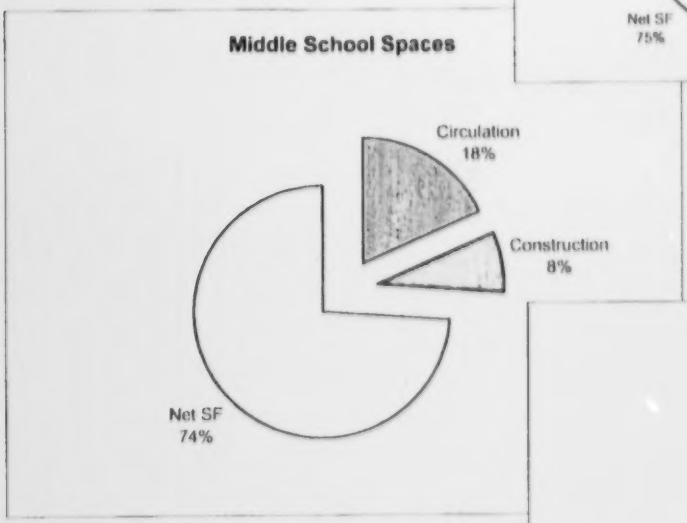


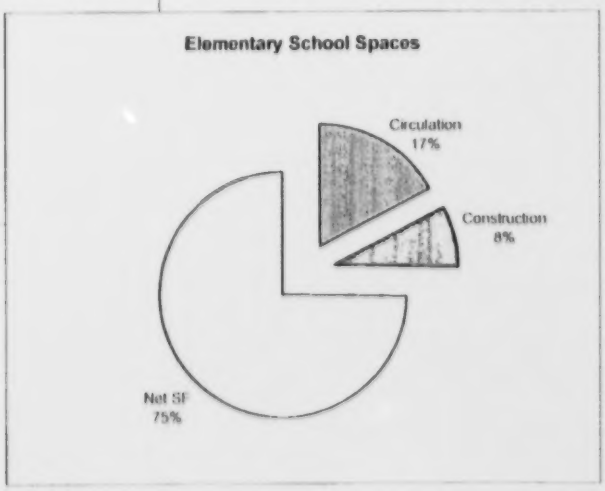


Comparisons of GROSS Spaces in Educational Facilities









Fanning/Howey Associates, Inc. Profile

Firm Profile

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Fanning/Howey Associates, Inc. is an architectural/engineering/consulting firm providing professional services to educational clients for 41 years.

CLIENTELE

Fanning/Howey's extensive design experience, as well as our reputable background in service, has resulted in clientele in Alaska, Colorado, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Maryland, Michigan, Minnesota, Montana, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Virginia, West Virginia, Washington, Washington DC, Wisconsin, and the Philippines.

PRINCIPALS

Vonda M. Alberson, AIA
Riyad Bannourah
Kent A. Bryan, PE
Ronald H. Fanning, AIA, PE, REFP
Stuart E. Franzen, ASLA
Michael E. Hall, AIA, REFP
Clair E. Howey, AIA
James H. Jelliffe, AIA
George M. Kacan, AIA, REFP
Sandra M. Kate
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James R. Mumby, AIA
William E. Payne, AIA
James K. Perkins, ASLA
Mark W. Ranyak, AIA
Bruce T. Runyon, AIA
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John F. Swindell, AIA
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John G. Willi, AIA, REFP
Stephen J. Wilczynski, AIA
J. Scott Winchester, AIA

PRINCIPALS EMERITUS

Thomas J. Dunwoody, AIA
Lee J. Brockway, AIA

STAFF

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LOCATIONS

Celina, Ohio
Michigan City, Indiana
West Palm Beach, Florida
Williamston, Michigan
Alexandria, Virginia
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Indianapolis, Indiana
Orlando, Florida
Novi, Michigan

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Expertise

Fanning/Howey Associates, Inc. is a national leader in K-12 educational facility design. In the last five years, we have completed over 880 school projects totaling over $5.4 billion in construction volume.

FIRM-WIDE EXPERIENCE	221	New Facilities	$3,450,978,912
	48	Additions	95,813,979
	235	Additions/Remodeling	1,553,920,497
	326	Remodeling	274,745,756
	51	Technology Projects	33,913,004
	881	Projects	$5,409,372,148

CLIENTELE 97% of our construction volume is in educational facility design

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Over 300 Educational Feasibility Studies (Buildings)
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